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IN THE UNITED STATES PATENT & TRADEMARK OFFICE

IN RE APPLICATION OF	:
KIMIYASU SATOH, ET AL.	: EXAMINER: CHOWDHURY, A.
SERIAL NO: 10/537,417	:
FILED: JUNE 2, 2005	: GROUP ART UNIT: 2629
FOR: INPUT DEVICE, PORTABLE ELECTRONIC APPARATUS, REMOTE CONTROL DEVICE, AND PIEZOELECTRIC ACTUATOR DRIVING/CONTROLLING METHOD IN INPUT DEVICE	:

APPEAL BRIEF

COMMISSIONER FOR PATENTS
ALEXANDRIA, VIRGINIA 22313

SIR:

This is an appeal from the rejection of the claims contained in the Office Action dated March 26, 2008. A Notice of Appeal was timely filed on August 21, 2008.

I. REAL PARTY IN INTEREST

The real party in interest for this appeal in the present application is Sony Corporation, by way of Assignment recorded in the U.S. Patent and Trademark Office at Reel 018150, Frame 0834.

II. RELATED APPEALS AND INTERFERENCES

To the best of appellants' knowledge, there are no other appeals or interferences that will directly effect or be directly effected by, or having a bearing on, the Board's decision in this appeal.

III. STATUS OF CLAIMS

Claims 1-12 are pending in this application. Claims 1-12 were rejected in the March 26, 2008 Office Action, which rejection forms the basis of this appeal.

IV. STATUS OF AMENDMENTS

The Amendment filed May 22, 2008 after the Final rejection of March 26, 2008, was entered by the Examiner as indicated in the Advisory Action mailed June 18, 2008. No further amendments have been filed subsequent to the May 22, 2008 Amendment.

V. SUMMARY OF CLAIMED SUBJECT MATTER

The claimed invention relates to an input apparatus and a control method for the input apparatus. In accordance with one of the features of the invention, Appellants have recognized an advantageous arrangement wherein large power consumption and shortened life of the piezoelectric actuator are avoided. This arrangement is included in independent Claims 1 and 12.

By way of example, Claim 1 recites an input apparatus 100 (Fig. 1, page 9, lines 11-17 of the specification) outputs coordinate values of an operation surface 2a (Fig. 1, page 10, lines 4-10 of the specification) that the user has pressed as an input operation (page 11, lines 11-22 of the specification), deforms the operation surface 2a (page 11 line 23 to page 12 line 6 of specification), and causes the user to feel a force sense as a feedback with the deformed

operation surface 2a (page 12 lines 6-9; page 15, lines 2-11). The input apparatus 100 includes a deformation mechanism portion that uses a piezoelectric actuator 3 (Fig. 1, page 9 line 21) composed of a piezoelectric bi-morph device (page 10 lines 25-26) and that deforms the operation surface 2a (Figs. 1, 2A, 2B, page 9 lines 19-21; and page 12 lines 1-6 in the specification), and a press force detection portion detects whether the operation surface 2a has been pressed (page 12, lines 9-13). The input apparatus 100 includes a control portion (Fig. 5, page 21, lines 12-26) that controls the deformation mechanism portion to start driving the piezoelectric actuator 3 to gradually deform the operation surface in one direction (page 15, lines 2-11) and then to deform the operation surface in a reverse direction (page 15 line 25 to page 16, line 6) so that the period for which the operation surface 2a is deformed in one direction is sufficiently larger than the period for which the operation surface is deformed in the reverse direction when said press force detection portion detects that the operation surface has been pressed (Fig. 4, page 18 line 6 to page 20 line 9).

Claim 12 recites a piezoelectric actuator drive control method for an input apparatus 100 (Fig. 1, page 9, lines 11-17 of the specification) that outputs coordinate values of an operation surface 2a (Fig. 1, page 10, lines 4-10 of the specification) that the user has pressed as an input operation (page 11, lines 11-22 of the specification), deforms the operation surface 2a (Figs. 1, 2A, 2B, page 9 lines 19-21; and page 12 lines 1-6 in the specification) with a piezoelectric actuator 3 (Fig. 1, page 9 line 21) composed of a piezoelectric bi-morph device (page 10 lines 25-26), and causes the user to feel a force sense as a feedback with the deformed operation surface 2a (page 12 lines 6-9; page 15, lines 2-11). The method includes starting applying a voltage to the piezoelectric actuator (page 10 line 25 to page 11line 2) and driving the piezoelectric actuator 3 to gradually deform the operation surface 2a in one direction (page 15, lines 2-11) and then in the reverse direction (page 15 line 25 to page 16, line 6) so that the period for which the operation surface is deformed in one direction is

sufficiently larger than the period for which the operation surface is deformed in the reverse direction when it is detected that the operation surface has been pressed (Fig. 4, page 18 line 6 to page 20 line 9).

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

1) The first ground of rejection to be reviewed on appeal is of Claims 1-7 and 9-12 under 35 U.S.C. §103(a) over JP2002-259095 to Shigeki in view of JP11-212725 to Yoshitaka and further in view of U.S. Publication 2003/0205450 to Divigalpitiya. Claims 2-7 and 9-11 depend from independent Claim 1.

2) The second ground of rejection to be reviewed on appeal is of Claim 8 under 35 U.S.C. §103(a) over JP2002-259095 to Shigeki in view of JP11-212725 to Yoshitaka, U.S. Publication 2003/0205450 to Divigalpitiya and further in view of U.S. Patent No. 6,422,757 to Wu. Claim 8 depends from independent Claim 1.

VII. ARGUMENTS

A) The 35 U.S.C. §103(a) rejection of independent Claims 1 and 12.

Independent Claims 1 and 12 are rejected in the ground of rejection to be reviewed on appeal. In the ground of rejection to be reviewed on appeal, Claims 1 and 12 were rejected under 35 U.S.C. §103(a) as unpatentable over Shigeki, Yoshitaka, and Divigalpitiya.

Independent Claim 1 includes the features of a control portion that controls a deformation mechanism portion to start driving the piezoelectric actuator to gradually deform the operation surface in one direction and then to deform the operation surface in a reverse direction so that the period for which the operation surface is deformed in one direction is sufficiently larger than the period for which the operation surface is deformed in the reverse direction when said press force detection portion detects that the operation surface has been pressed. That is, Claim 1 is directed to an input apparatus that among other things includes a

control portion that controls a deformation mechanism. Independent Claim 12 recites features similar to those recited in Claim 1.

Accordingly, the independent claims are directed to driving the piezoelectric actuator to gradually deform the operation surface in one direction. Then the control portion drives the piezoelectric actuator to deform the operation surface in the reverse direction. The control portion controls these operations such that a period of deformation in one direction is sufficiently larger than the period in which the operation surface is deformed in the reverse direction. As such, the control portion drives the deformation in two directions. The applied art does not teach or suggest these features.

Specifically, Shigeki merely discusses in paragraph [0040] that there is a "sense-of-force device" that is operated to resist a user's finger when pushed thereon. The sense-of-force device uses a bobbin coil to "put back to a user side" the user's finger after the user's finger is used to push on the surface. It is this "put-back" force that Shigeki uses to provide a sense of feedback. However, Shigeki does not teach or suggest a control portion that controls the deformation mechanism to start driving the piezoelectric actuator to deform the operation surface in one direction and then in another direction, as set forth in the claimed invention. Rather, in Shigeki it is the user's finger that pushes the surface in a first direction. There is no control portion that drives the piezoelectric actuator to gradually deform the operation surface as claimed. Accordingly, Shigeki does not disclose a control portion that controls said deformation mechanism to start driving the actuator in one direction and then in the reverse direction. Shigeki is distinguished in the background section of the present application. See, e.g., page 2, beginning at line 13.

The outstanding Office Action also refers to paragraphs [0020] and [0046] in Shigeki. However, [0020] merely discusses an actuator with which the touch panel is interlocked with energization of each contact, operates in the input device and the actuator returns the sense of

force from which it responds for every contact. Paragraph [0046] merely discusses a driver circuit to provide feedback by driving the bobbin coil. As such, Shigeki simply does not disclose a control portion that drives the operation surface gradually in one direction and then in the reverse direction.

The remaining applied art does not make up for the deficiencies of Shigeki discussed above nor does the outstanding Office Action assert as such. For example, Yoshitaka merely discusses a piezoelectric device that detects an input position. Divigalpitiya is asserted for its description of different periods for driving the surface in one direction, from the other direction. However, it seems that the outstanding Office Action is construing the reverse direction where the surface is merely restored (through resiliency) to the original position as "driving" a piezoelectric actuator. Divigalpitiya is merely describing the "relax" time of the particular materials involved without any particular description of driving the actuator.

In one or more embodiments of the invention, a press force detection portion 61 detects a timing at which the user presses the touch panel portion 2 "PUSH timing" and the timing at which the user releases his finger is "PULL timing". A sense pressure set switch 71 can be set to a level of sensitivity of a force sense that the user can feel with force sense feedback function at the touch panel 2, see at least page 23, lines 2-7, and a sense pressure set portion supplies an operation start signal to the timer 81 at the PUSH timing supplied from the press force detection portion 61.

For example, Figure 4 shows a situation where the Y axis shows a deformation amount of an operation surface. At time T401, the deformation amount moves from the zero to a maximum amount at time T402. During this time, the piezoelectric actuator 3 is driven to cause the operation surface to gradually deform upward (specification page 18, lines 22-25). After a predetermined time period T1, at the time T402, the piezoelectric actuator is driven to deform the operation surface in the reverse direction. The operation surface is

deformed to a maximum amount in the opposite direction at time T403. (Specification page 19, lines 3-5). As discussed at page 19, lines 21-25, when the period T1 is much longer than the period T2, the user almost does not feel the upward deformation during time period T1, but then during period T2, the user can feel a "click sense" with a much larger force sense then that during period T1. An advantage with this approach is that the touch panel may be deformed from being maximally curved in one direction and then maximally curved in the reverse direction without having power consumed by the piezoelectric actuator to become large (specification page 3, line 21 to page 4, line 7) or using power in a standby state. With this efficient use of power, the user gets the tactile sensation of a "click" by the slow movement of the operation surface in one direction followed by a rapid movement in the opposite direction.

B) The 35 U.S.C. § 103(a) rejection of Claim 8.

Dependent Claim 8 is rejected in the second ground of rejection to be reviewed on appeal. In the second ground of rejection to be reviewed on appeal, Claim 8 was rejected under 35 U.S.C. §103(a) as unpatentable over Shigeki, Yoshitaka, Divigalpitiya, and Wu.

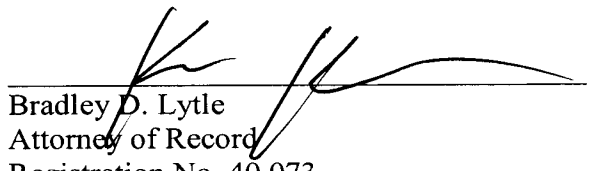
Claim 8 depends from Claim 1, which applicant believes is patentable as discussed with respect to the first ground of rejection. Thus, as Wu does not cure any of the above-noted deficiencies of Shigeki, Yoshitaka, Divigalpitiya, it is respectfully submitted that Claim 8 is patentable for at least the reasons discussed above with respect to Claim 1.

VIII. CONCLUSION

In view of the above remarks, Appellants respectfully request THAT the rejections of the Office Action dated March 26, 2008 be REVERSED.

Respectfully submitted,

OBLON, SPIVAK, McCLELLAND,
MAIER & NEUSTADT, P.C.



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CLAIMS APPENDIX

Claim 1 An input apparatus that outputs coordinate values of an operation surface that the user has pressed as an input operation, deforms the operation surface, and causes the user to feel a force sense as a feedback with the deformed operation surface, comprising:

a deformation mechanism portion that uses a piezoelectric actuator composed of a piezoelectric bi-morph device and that deforms the operation surface;

a press force detection portion that detects whether the operation surface has been pressed; and

a control portion that controls said deformation mechanism portion to start driving the piezoelectric actuator to gradually deform the operation surface in one direction and then to deform the operation surface in a reverse direction so that the period for which the operation surface is deformed in one direction is sufficiently larger than the period for which the operation surface is deformed in the reverse direction when said press force detection portion detects that the operation surface has been pressed.

Claim 2 The input apparatus as set forth in claim 1,

wherein when the maximum deformation amount of the operation surface deformed by said deformation mechanism portion is 200 μm or less, the period for which the operation surface is deformed in one direction is 33 times or more than the period for which the operation surface is deformed in the reverse direction.

Claim 3 The input apparatus as set forth in claim 1,

wherein the period for which the operation surface is deformed in the first direction is 200 msec or less.

Claim 4 The input apparatus as set forth in claim 1, further comprising:

a deformation amount set portion that sets the deformation amount of the panel surface corresponding to setting of the user,

wherein said control portion deforms the operation surface corresponding to setting of the deformation amount of the operation surface.

Claim 5 The input apparatus as set forth in claim 4,

wherein said control portion gradually increases or decreases a drive voltage of the piezoelectric actuator always corresponding to the same waveform and varies the period for which the drive voltage increases or decreases corresponding to the waveform to vary the deformation amount of the operation surface in one direction.

Claim 6 The input apparatus as set forth in claim 1,

wherein said control portion controls said deformation mechanism portion to keep the operation surface deformed in the reverse direction until said press force detection portion detects that the operation surface has been pressed.

Claim 7 The input apparatus as set forth in claim 6,

wherein said control portion controls said deformation mechanism portion to deform the operation surface in the reverse direction for a predetermined period and the operation surface for a period sufficiently longer than the predetermined period so that the voltage

applied to the piezoelectric actuator becomes 0 V when said press force detection portion detects that the operation surface has been pressed.

Claim 8 The input apparatus as set forth in claim 1,

wherein said deformation mechanism portion has:

a first spacer disposed on a front surface in the vicinity of a center portion of the piezoelectric actuator; and

a second spacer and a third spacer disposed on an opposite surface of the front surface of the piezoelectric actuator, the second spacer and the third spacer being disposed in the vicinity of end portions in the longitudinal direction of the piezoelectric actuator,

wherein the piezoelectric actuator is curved in the direction perpendicular to the surfaces on which the spacers are disposed so as to vary the distance between the front surface of the first spacer and the front surface of the second and third spacers and deform the operation surface.

Claim 9 The input apparatus as set forth in claim 1, further comprising:

a display portion that transmits the operation surface and displays a screen,

wherein when an operation function item displayed on said display portion is pressed through the operation surface, the operation function item is selected and input.

Claim 10 A portable electronic apparatus comprising:

the input apparatus as set forth in claim 1.

Claim 11 A remote control apparatus comprising:

the input apparatus as set forth in claim 1.

Claim 12 A piezoelectric actuator drive control method for an input apparatus that outputs coordinate values of an operation surface that the user has pressed as an input operation, deforms the operation surface with a piezoelectric actuator composed of a piezoelectric bi-morph device, and causes the user to feel a force sense as a feedback with the deformed operation surface, comprising the step of:

starting applying a voltage to the piezoelectric actuator and driving the piezoelectric actuator to gradually deform the operation surface in one direction and then in the reverse direction so that the period for which the operation surface is deformed in one direction is sufficiently larger than the period for which the operation surface is deformed in the reverse direction when it is detected that the operation surface has been pressed.

EVIDENCE APPENDIX

None

RELATED PROCEEDINGS APPENDIX

None